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## **VORTEX PHASE DIAGRAMS IN $R_3\text{Rh}_4\text{Sn}_{13}$ ( $R = \text{Yb}, \text{Ca}$ )**

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The weakly pinned, isotropic low  $T_c$  superconductors  $\text{Yb}_3\text{Rh}_4\text{Sn}_{13}$  and  $\text{Ca}_3\text{Rh}_4\text{Sn}_{13}$  have emerged as important systems to witness a variety of issues related to phase transitions in vortex matter [1,2]. The (soft) vortex medium is a convenient prototype for studying the interplay as well as competition between interaction and disorder effects in condensed matter. In weakly pinned systems, the critical current density  $J_c$  imbibes information on the spatial and temporal correlation in the flux line lattice (FLL). The anomalous variations in  $J_c(H, T)$  thus provide information on the transformations of the vortex matter. We present a status report on the studies related to the two well-known anomalous variations in  $J_c(H, T)$  known as the Peak Effect (PE) and the Second Magnetization Peak (SMP) in  $R_3\text{Rh}_4\text{Sn}_{13}$  ( $R = \text{Yb}, \text{Ca}$ ) crystals. The novel features include the pinning induced step-wise amorphization of the FLL and the observation of the SMP and the PE in an isothermal scan. The close resemblances between the observed behavior in these compounds and those in anisotropic high  $T_c$   $\text{YBa}_2\text{Cu}_3\text{O}_7$  and the low  $T_c$   $2\text{H-NbSe}_2$  shall be highlighted.

1. C.V. Tomy *et al* Physica C **280**, 1 (1997); Phys. Rev. B **56**, 8346 (1997).
2. S. Sarkar *et al* Phys. Rev. B **61**, 12394 (2000); Physica C **341-348**, 1055 (2000); **341-348**, 1085 (2000); Physica C (in press).